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APPLICATION

FOR

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TITLE: PHOTODEFINABLE POLYMERS FOR SEMICONDUCTOR APPLICATIONS

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PHOTODEFINABLE POLYMERS FOR SEMICONDUCTOR APPLICATIONS

Background

This invention relates generally to the fabrication of integrated circuits.

In the fabrication of integrated circuits, it is desired to pattern various structures defined on a substrate. This patterning may involve the exposure of photodefinable layers to an energy source such as light or other radiation. The exposed layers react upon exposure and either become more or less easily removed.

Examples of applications for photodefinable materials in semiconductor fabrication include photoresists, dry film resists, buffer coatings, and photodefinable dielectrics.

Existing photodefinable buffer coating for use in semiconductor applications have less than optimal mechanical and chemical properties. For example, the modulus and chemical resistance of some buffer coating materials is insufficient, resulting in mechanical or chemical failure under certain circumstances.

Thus, there is a need for better ways to make photodefinable buffer coatings for semiconductor applications.

Detailed Description

In accordance with one embodiment of the present invention, a photodefinable buffer coating may comprise polybenzoxazole (PBO) and PBO precursors. The precursor is an uncured polymer and may be blended with filler and then cured to form a chemically modified polymer layer.

The filler contributes advantageous mechanical and chemical properties such as improved modulus or improved chemical resistance to the system. In addition, the filler advantageously adheres well to the matrix. Furthermore, a surface treatment may be applied to the filler to promote adhesion to the matrix material and/or to facilitate blending.

In some embodiments, the filler may have a relatively small particle size so as to be non-scattering to the radiation used to photodefine the resulting composite system. Thus, in some embodiments, the filler may have a particle size less than 100 nanometers and in other embodiments, the filler may have a particle size less than 20 nanometers. In accordance with one embodiment of the present invention, the filler may be silica particles. In other embodiments of the invention, the filler may be zirconia particles.

The use of silica or zirconia particles may be advantageous in some embodiments because they can contribute good chemical resistance to solvent-based

strippers, increased transparency, and low coefficient of thermal expansion to the final formulation. In one embodiment, Zirconia particles approximately 13 nanometers in diameter may be incorporated into the system at from about 9 to about 20 percent by weight. The resulting composite polymer system, consisting of the filler and polymer, may then be utilized as a buffer coating.

While the present invention has been described with respect to a limited number of embodiments, those skilled in the art will appreciate numerous modifications and variations therefrom. It is intended that the appended claims cover all such modifications and variations as fall within the true spirit and scope of this present invention.

What is claimed is: